



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,081	02/19/2004	Sunil V. Hattangady	TI-31017.1	6261

23494 7590 11/30/2004

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER


RICHARDS, N DREW

ART UNIT	PAPER NUMBER
----------	--------------

2815

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/783,081	Applicant(s) HATTANGADY ET AL.	
	Examiner N. Drew Richards	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16 and 18-20 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 16 and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Buchanan et al. (U.S. Patent No. 6,511,876 B2).

Buchanan et al. disclose a semiconductor structure in figures 1-5 and on columns 1-10. Specifically, with regard to claim 16, Buchanan et al. disclose in figure 2D:

a semiconductor substrate 10 having a surface (top surface not labeled);

a gate stack 16/14/12 outward of the surface of the semiconductor substrate 10, the gate stack comprising:

a nitrided silicon oxide layer 12 comprising an oxide layer beneath a nitride layer (layer 12 is disclosed as an interfacial dielectric on column 4 line 4; column 4 lines 12-14 disclose that the interfacial dielectric 12 can be an oxide layer beneath a nitride layer);

a high-K dielectric layer 14 outward of the nitrided silicon oxide layer 12 (layer 14 is disclosed as a high-K dielectric on column 4 line 59, for example); and

Art Unit: 2815

a conductive layer 16 outward of the high-K layer 14 (column 6 lines 27-31); sidewall spacers outward of the semiconductor substrate 10 adjacent to the gate stack 16/14/12 (sidewalls spacers not shown, disclosed on column 7 lines 50-52); and source/drain regions in the semiconductor substrate 10 adjacent to the sidewall spacers (source/drain not shown, disclosed on column 7 lines 47-50, as disclosed they are formed after the sidewalls spacers and thus will be adjacent to the sidewalls spacers).

With regards to Buchanan et al. disclosing the nitrided silicon oxide layer comprising an oxide layer beneath a nitride layer. Buchanan et al. disclose on column 4 lines 12-15 that the interfacial oxide 12 "may be comprised of an oxide, nitride, oxynitride, or any combination thereof including multilayers." This disclosure includes a limited amount of species of layers including the claimed oxide layer beneath a nitride layer. Thus, this anticipation rejection is based upon the choice of a specific composition chosen from a limited number of disclosed compositions. See MPEP 2131.02.

With regard to claim 18, Buchanan et al. disclose a thickness of the nitrided silicon oxide layer 12 being less than about 20 Angstroms (column 4 line 54; disclosed as being 0.2-2 nanometers which converts to 2-20 Angstroms).

With regard to claim 19, the high-K dielectric layer 14 comprises an oxygen-containing material (column 5 line 42 through column 6 line 5).

Art Unit: 2815

With regard to claim 20, the high-K dielectric layer comprises a material selected from the group consisting of Ta₂O₅, BaTiO₃, TiO₂, CeO₂, and barium strontium titanate (column 5 lines 42-65).

Allowable Subject Matter

3. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record fails to teach, disclose, or suggest, either alone or in combination, the structure as claimed including the nitride layer having a maximum atomic percentage of nitrogen as claimed and the oxide layer having a maximum atomic percentage of nitrogen as claimed.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ma et al. (U.S. Patent No. 6,407,435 B1), Wallace et al. (U.S. Patent No. 6,420,729 B2), Halliyal et al. (U.S. Patent No. 6,674,138 B1), Visokay et al. (U.S. Patent No. 6,696,332 B2).

Art Unit: 2815

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'N. Drew Richards', is written over the printed name.

N. Drew Richards
AU 2815